IN THE CLAIMS

The following claim set replaces any prior versions of the claims.

1. (withdrawn) A method for making a tunnel valve head with a flux guide, comprising:

forming a tunnel valve at a first shield layer, the tunnel valve comprising a free layer distal to the first shield layer;

depositing a first insulation layer over the first shield layer and around the tunnel valve;

depositing a flux guide over the first insulation layer and coupling to the tunnel valve at the free layer;

covering the flux guide with a second insulation layer; and

forming a second shield layer over the second insulation, wherein the flux guide and the free layer are physically isolated by the first and second insulation layers to prevent current shunts therefrom.

2. (withdrawn) The method of claim 1 wherein the depositing the first insulation layer over the first shield layer and around the tunnel valve is performed using a self-aligning process wherein regions of different thicknesses are formed with a single masking step.

3. (withdrawn) The method of claim 1 wherein the flux guide is physically connected to the free layer of the tunnel valve.

4. (withdrawn) The method of claim 1 wherein the covering the flux guide with a second insulation layer is performed using a self-aligning process wherein regions of different thicknesses are formed with a single masking step.

5. (withdrawn) The method of claim 1 wherein the flux guide increases the amount of magnetic flux in the tunnel valve.

6. (withdrawn) The method of claim 1 wherein the increase in the amount of magnetic flux in the tunnel valve enhances the outptu signal fo the tunnel valve.

7. (withdrawn) The method of claim 1 wherein the forming a tunnel valve at a first shield layer further comprises:

forming an antiferromagnetic (AFM) layer of electrically insulating antiferromagnetic material;

depositing a pinned layer of ferromagnetic material in contact with said AFM layer, said pinned layer making electrical contact with said first shield;

forming a free layer of ferromagnetic material; and

forming a tunnel junction layer of electrically insulating material between said pinned and free layers.

8. (currently amended) A tunnel valve sensor, comprising:

a tunnel valve disposed at a first shield layer, the tunnel valve comprising a free layer distal to the first shield layer;

a first insulation layer formed over the first shield layer and abutting the sides of ~~around~~ the tunnel valve;

a flux guide deposited over the first insulation layer and onto a portion of a first and second side of the tunnel vale, the flux guide ~~being coupled to~~ making contact with the tunnel valve at the free layer only on the first and second sides of the tunnel valve with a gap therebetween;

a second insulation layer ~~covering~~ disposed over the flux guide and onto only a portion of the tunnel valve to encapsulate the flux guide and to leave a portion of the tunnel valve exposed; and

a second shield layer deposited over the second insulation, wherein ~~the flux guide and the free layer are physically connected, and~~ the flux guide is physically isolated from the first and second shield layers by the first and second insulation layers to prevent current shunts therefrom.

9. (canceled) The tunnel valve sensor of claim 8 wherein the flux guide is physically connected to the free layer of the tunnel valve.

10. (original) The tunnel valve sensor of claim 8 wherein the flux guide increases the amount of magnetic flux in the tunnel valve.

11. (previously presented) The tunnel valve sensor of claim 10 wherein the increase in the amount of magnetic flux in the tunnel valve enhances the output signal of the tunnel valve.

12. (currently amended) The tunnel valve sensor of claim 8 wherein the tunnel valve further comprises:

an antiferromagnetic (AFM) layer of electrically insulating antiferromagnetic material;

a pinned layer of ferromagnetic material in contact with said AFM layer, said pinned layer making electrical contact with said first shield;

a free layer of ferromagnetic material; and

a tunnel junction layer of electrically insulating material disposed between said pinned and free layers.

13. (currently amended) A magnetic storage system, comprising:

a magnetic recording medium;

a tunnel valve sensor disposed proximate the recording medium, the tunnel valve sensor, comprising

a tunnel valve disposed at a first shield layer, the tunnel valve comprising a free layer distal to the first shield layer;

a first insulation layer formed over the first shield layer and abutting the sides of ~~around~~ the tunnel valve;

a flux guide deposited over the first insulation layer and onto a portion of a first and second side of the tunnel vale, the flux guide ~~being coupled to~~ making contact with the tunnel valve at the free layer only on the first and second sides of the tunnel valve with a gap therebetween;

a second insulation layer ~~covering~~ disposed over the flux guide and onto only a portion of the tunnel valve to encapsulate the flux guide and to leave a portion of the tunnel valve exposed; and

a second shield layer deposited over the second insulation, wherein ~~the flux guide and the free layer are physically connected, and~~ the flux guide is physically isolated from the first and second shield layers by the first and second insulation layers to prevent current shunts therefrom.

an actuator for moving the tunnel valve sensor across the magnetic recording disk so the tunnel valve sensor may access different regions of magnetically recorded data on the magnetic recording medium; and

a data channel coupled electrically to the tunnel valve sensor for detecting changes in resistance of the tunnel valve sensor caused by rotation of the magnetization axis of the free ferromagnetic layer relative to the fixed magnetization of the pinned layer in response to magnetic fields from the magnetically recorded data.

14. (canceled) The magnetic storage system of claim 13 wherein the flux guide is physically connected to the free layer of the tunnel valve.

15. (original) The magnetic storage system of claim 13 wherein the flux guide increases the amount of magnetic flux in the tunnel valve.

16. (previously presented) The magnetic storage system of claim 15 wherein the increase in the amount of magnetic flux in the tunnel valve enhances the output signal of the tunnel valve.

17. (original) The magnetic storage system of claim 13 wherein the tunnel valve further comprises:

an antiferromagnetic (AFM) layer of electrically insulating antiferromagnetic material;

a pinned layer of ferromagnetic material in contact with said AFM layer, said pinned layer making electrical contact with said first shield;

a free layer of ferromagnetic material; and

a tunnel junction layer of electrically insulating material disposed between said pinned and free layers.